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January 9, 2017

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Remedial Project Manager
US EPA Region 4
Superfund Restoration & Sustainability Section
61 Forsyth Street, S.W.
Atlanta, GA 30303-8909

re: Supplemental Vapor Intrusion Sampling Work Plan
Cabot/Koppers Superfund Site, Gainesville, Alachua County, Florida

Dear Rusty:

On behalf of Cabot Corporation, we have prepared this work plan for supplemental vapor intrusion (VI) sampling at selected locations within the former Winn Dixie building at the Northside Shopping Center (Figure 1), which is built on a portion of the Cabot/Koppers Superfund Site, at the corner of N. Main Street and NE 23rd Avenue in Gainesville, Florida (hereinafter, the "Site"). As part of this work plan, we propose that up to six paired indoor air/sub-slab soil gas samples be collected inside the building as well as an ambient (outdoor) air sample proximate to the building.

Pending your prompt review of this work plan and the consent and cooperation of the building owner, we would anticipate that these investigations would take place within the next several weeks, in late January or February 2017, so that sampling can be conducted during the heating season – generally recognized as a "worst-case scenario" – and prior to occupancy of the building by a new tenant. Additional information is provided below.

## 1 Background

As you are aware, Gradient completed a soil gas investigation and VI assessment at the Site in 2012 (Gradient and Weston Solutions, Inc., 2013). The objective of this study was to assess the potential human health risks associated with the VI exposure pathway, consistent with a recommendation of the 2011 five-year review (FYR) report for the Site (E2 Inc., 2011). The sampling program was conducted in September 2012, and Gradient's report was finalized in May 2013 following review and comments provided by the Alachua County Environmental Protection Department (ACEPD), the City of Gainesville, the Florida Department of Health (FDOH), and the Florida Department of Environmental Protection (FDEP). These comments and Gradient's response are summarized in the May 2013 report cover letter (Levy and Sharma, 2013).[1] Subsequent to Gradient's efforts, Environmental Consulting and Technology, Inc. (ECT) conducted indoor air sampling on behalf of ACEPD in March 2013 and prepared an indoor air quality evaluation report (ECT, 2013). Both Gradient's VI assessment and ECT's sampling program demonstrated that the potential human health risks associated with VI were insignificant, as

[1] Both the May 2013 final report and its cover letter can be downloaded from the Cabot-Koppers Superfund document repository at the following address: http://bit.ly/1nz43DM.

defined by the United States Environmental Protection Agency (US EPA).[2] Our understanding is that US EPA agreed with Gradient's findings (Miller, 2015).

At the time Gradient's assessment was conducted, US EPA had not yet finalized its VI guidance. Although an external review draft was made publicly available in April 2013 (US EPA, 2013), this document was not finalized until June 2015 (US EPA, 2015a). To prepare its work plan (Gradient, 2012)[3] and conduct the investigations and VI assessment, Gradient relied on several guidance documents in effect at the time, including US EPA's 2002 draft VI guidance (US EPA, 2002), Interstate Technology & Regulatory Council (ITRC) VI guidance (ITRC, 2007), several state guidance documents, as well as additional US EPA reference documents, including US EPA's study on background volatile organic compound (VOC) concentrations in indoor air (US EPA, 2011), US EPA's VI database (US EPA, 2012), and US EPA's review of the 2002 draft guidance (US EPA, 2010). The approach used and the conclusions reached by Gradient's VI evaluation – *i.e.*, the Site poses insignificant VI risks and no additional investigations are needed – were not affected by US EPA's finalized VI guidance; this is because the new guidance document was drawing substantially from the above-referenced US EPA guidance and other guidance documents that were relied upon by Gradient to conduct its VI assessment. Additional supporting information was provided in a March 2016 letter from Gradient to US EPA, which was prepared as part of the most recent FYR (Sharma and Levy, 2016).

In August 2016, US EPA prepared a VI evaluation memorandum (Bentkowski, 2016), which used groundwater data collected by US EPA in March 2016 (US EPA Region IV, 2016) and computed human health risks based on US EPA's VI screening level spreadsheet (US EPA, 2016a). The memorandum concluded that the potential exceedance of acceptable risk levels warranted additional VI investigations. Cabot provided comments to US EPA's memorandum in a December 2016 letter (Reiber, 2016), including the fact that US EPA's VI screening levels were derived using a conservative upper-bound, generic groundwater-to-indoor air attenuation factor[4] designed to identify sites with potential – but unconfirmed – risk exceedance, and that the 2012 soil gas investigations and risk assessment (Gradient and Weston Solutions, Inc., 2013) had already demonstrated that the risks were insignificant. In its letter, however, Cabot indicated it was willing to perform supplemental sampling in the former Winn Dixie building to close out VI concerns related to its historical activities at the Cabot Carbon Site. Potential VI concerns raised by US EPA related to the creosote plume on the western side of the shopping center (Bentkowski, 2016) are related to the Koppers property and should be brought up directly with Beazer (Reiber, 2016).

The proposed sampling program is further described below and assumes that the property owner will provide access to conduct the work.

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[2] US EPA generally uses a cancer risk range of $10^{-6}$ to $10^{-4}$ as a "target range" within which to manage human health risk as part of site cleanups. For judging whether indoor air exposures may pose acceptable health risk based on potential non-cancer effects, US EPA generally recommends that the target hazard index not exceed 1 (US EPA, 1991; 2015a, Section 7.4.1).

[3] See Cabot-Koppers Superfund document repository at the following address: http://bit.ly/1Pk1zmV.

[4] It should be noted that this attenuation factor (0.001 or $10^{-3}$) is derived on the basis of chlorinated VOCs in residential settings (US EPA, 2012; 2015a, Appendix A). Petroleum VOCs are more likely to biodegrade in the vadose zone, which limits the potential for vapor intrusion concerns, and large commercial buildings typically exhibit more attenuation than residential structures due to thicker slabs and higher air exchange rates (US EPA, 2015a, Sections 1.3.1, 6.5.3, and A.4).

# 2 Sampling Plan

The proposed work plan will include the collection of the following samples:

- Up to six sub-slab soil gas samples to be collected in the former Winn Dixie building (see four preliminary locations shown on Figure 1);
- Up to six indoor air samples paired with the sub-slab soil gas locations; and
- One ambient (outdoor) air sample collected proximate to the building, preferably from an upwind direction.

Sub-slab samples will be collected to assess the presence of VOCs beneath the building slab and, assuming VOCs are present, to determine whether VOC concentrations are indicative of a potential VI concern. The collection of indoor air samples will help evaluate whether VOCs are present at concentrations that may exceed acceptable risk levels, based on a typical exposure duration scenario in a non-residential setting. Note that many VOCs, including BTEX[5] and naphthalene, are commonly found in the indoor air of buildings without necessarily being attributable to VI (*e.g.*, US EPA, 2011, 2015b). The relative magnitude of the concentration of a given VOC in indoor air to its concentration in sub-slab soil gas will help determine whether the presence of this VOC in indoor air can be reasonably attributable to VI or whether other reasons may explain its presence, such as ambient (outdoor) air contributions, building construction materials, or chemicals or other material that may be kept on the premises. The ambient air sample will also help assess whether outdoor air may be contributing VOCs to the indoor air of the building.

The sampling approach and procedures will be conducted generally consistent with US EPA's June 2015 VI guidance (US EPA, 2015a). Note that we anticipate that samples will be collected with the heating, ventilation, and air conditioning (HVAC) system in operation, so that indoor air samples are representative of the building under typical working and occupancy conditions. As noted previously, however, the samples will be collected during the heating season (*i.e.*, when outdoor air exchanges *via* the HVAC system may be lowest), which is generally representative of worst-case conditions (US EPA, 2015a, Section 6.4.1).

## 2.1 Building Survey

Prior to conducting the sampling activities and after obtaining access agreement from the building owner, a survey of the former Winn Dixie building will be conducted with the following objectives:

- Obtain basic information about the building (*e.g.*, future use, square footage, and occupancy);
- Collect information related to the type of structure and construction (*e.g.*, building height, slab-on-grade, potential presence of separate rooms where additional sampling locations may be placed);
- Confirm the operation of and compile information related to the HVAC system (*e.g.*, number and locations of air handling units, locations of the HVAC air intake[s], ventilation rate and number of air-exchange per hour, hours of operation);

[5] BTEX stands for benzene, toluene, ethylbenzene, and xylenes.

- Observe building conditions that may affect sampling results and contribute to background concentrations in indoor air (*e.g.*, type of activities taking place inside the buildings, building materials);
- Inventory chemical use and storage within the building and other potential VOC-contributing sources;
- Check for the presence of sumps, cracks, holes, or other visible features (*e.g.*, topography around building) that may act as preferential pathways for the migration of vapor into indoor air;
- Identify final locations where sub-slab soil gas samples will be collected; and
- Confirm the absence of buried utilities and potential asbestos-containing material (*e.g.*, tile or adhesive) in the vicinity of the proposed sub-slab exploration locations.

As part of the survey, photographs of key building features and a questionnaire will be prepared (*e.g.*, ITRC, 2007, Appendix G; NJDEP, 2016, Appendix D).

## 2.2 Sub-slab Soil Gas Probe Installation and Sampling

Sub-slab soil gas samples will be collected from up to six temporary Vapor Pin® probes installed at the preliminary locations shown on Figure 1 (four locations shown). These locations were selected based on the results of the 2012 soil gas investigations (Gradient and Weston Solutions, Inc., 2013), which showed that VOC concentrations at exterior soil gas samples SG-1 and SG-2 were relatively elevated compared to other sampling locations. The proposed locations are preliminary and may be adjusted (or their number expanded up to six) based on the above-referenced survey.

Sampling activities will be conducted consistent with operating procedures and guidelines developed by US EPA for installing sub-slab probes and sampling soil gas (US EPA, 2015a, Section 6.4.3; Lockheed Martin Corp., 2015a,b), as well as procedures for installing Vapor Pin® probes (*e.g.*, CCA, 2016; MDEQ, 2013, Appendix F.7). After confirming the integrity of the concrete slab at the proposed location (*i.e.*, no floor cracks in the immediate vicinity), each temporary sub-slab soil gas probe will be installed by drilling a 5/8-inch-diameter hole through the slab and approximately 2-3 inches into the sub-slab material. The sub-slab soil gas probe will be constructed by tapping a Vapor Pin® and its silicon sleeve into place using a dead blow hammer. Teflon® tubing and a Swagelok® valve will be connected to the portion of the Vapor Pin® above the concrete slab. Following probe installation, differential pressure across the floor slab will be recorded using a digital micromanometer and recorded on field sampling summary forms. The drill bit used for installation and other reusable equipment will be decontaminated prior to the sampling program and between sampling locations with a detergent wash and distilled water rinse.

Following its installation, the integrity of the sub-slab soil gas probe will be verified by leak testing using the following procedure: helium (tracer gas) will be dispersed around each probe beneath an overturned bucket. While the helium is flowing, a soil gas sample will be collected into a Tedlar® bag connected to a peristaltic pump and a micromanometer. Samples will be collected at two to three different flow rates and vacuums (*e.g.*, 0.1, 0.5, and 1 inch of water) to assess the relationship between purge rate and resulting vacuum. Flow rates will be calculated by measuring the time to fill the Tedlar® bag (with a known volume of 1 liter). To assess whether helium leakage has occurred through the probe annular seal or probe fittings, the contents of the Tedlar® bag will be screened with a helium detector.

Sub-slab soil gas sampling will take place on the day following probe installation and integrity testing. Prior to sampling, each sub-slab soil gas probe will be purged of one to three internal volumes using a disposable syringe. The sub-slab soil gas samples will be collected over a period of 1 hour in pre-evacuated, 1-liter, stainless steel, Summa canisters connected to flow controllers (controlling flow rate to an average flow rate of about 13 milliliters per minute [mL/min]). Following sample collection, the canisters will be submitted to an accredited analytical laboratory to undergo analysis for VOCs (including naphthalene) by gas chromatography/mass spectrometry (GS/MS) based on US EPA method TO-15.

Following sample collection, an additional differential pressure measurement will be obtained from the sub-slab soil gas probe. A soil gas sample will also be collected into a Tedlar® bag with a peristaltic pump and screened for VOCs using a photo-ionization detector (PID), and for oxygen, methane, and carbon dioxide using a multi-gas meter. Following screening, the tubing and Vapor Pin® assembly will be removed and the hole will be filled with hydraulic cement.

Sampling information, including canister and flow controller identification, initial and final canister vacuums, sampling start and end times, as well as integrity testing and field screening results, will be recorded in a field sampling summary form. The coordinates of the sub-slab soil gas sampling probe will be logged using a global positioning system (GPS) device or measured from key building features (*e.g.*, walls, columns). Additionally, photographs of each sub-slab soil gas probe set-up will be taken to document sampling activities.

## 2.3 Indoor and Ambient (Outdoor) Air Sampling

Up to six indoor air samples will be collected at locations paired with the sub-slab soil gas sampling locations shown on Figure 1. Indoor air samples will be collected consistent with operating procedures and guidelines developed by US EPA for sampling indoor air (US EPA, 2015a, Section 6.4.1; Lockheed Martin Corp., 2015a). The indoor air samples will be collected over an 8-hour period using pre-evacuated 6-liter Summa canisters and flow controllers (average flow rate of about 10 mL/min). The canisters will be placed at breathing-level height (*i.e.*, about 5 feet above the ground). In addition, for quality control purposes, one blind duplicate sample will be collected by placing one additional canister (*i.e.*, two adjacent canisters) at one of the sampling locations.

One ambient (outdoor) air sample will also be collected at a location outside of the facility, preferably in the upwind direction (tentatively identified as the northeastern corner of the building). Outdoor air samples will be collected using an approach consistent with that used for the collection of the indoor air samples, using 6-liter Summa canisters and 8-hour flow controllers (see also, US EPA, 2015a, Section 6.4.2).

Following sample collection, the canisters will be analyzed for VOCs (including naphthalene) by the analytical laboratory, using US EPA method TO-15. VOCs of interest for which the typical TO-15 detection limit is less than US EPA's non-residential indoor air screening levels (US EPA, 2016b, pp. 64-73), will undergo selective ion monitoring (SIM) analysis as-needed to achieve a lower detection limit (*e.g.*, naphthalene, benzene, ethylbenzene).

Sampling information will be recorded in field sampling summary forms, including canister and flow controller identification, initial and final canister vacuums, sampling start and end times, as well as temperature and weather conditions for the ambient air sample. The coordinates of the indoor/ambient air samples will be logged using a GPS device or measured from key building features (*e.g.*, walls). Photographs of each sampling set-up will be taken to document field sampling activities.

# 3 Schedule and Reporting

Assuming prompt review and approval of this work plan by US EPA, sampling will be conducted in late January or February 2017, prior to occupancy of the building by the new tenant.

Analytical results are expected to be received approximately 2 weeks after the completion of the sampling program. We will review the results and document of our findings and recommendations in a letter report to include a narrative describing the results and copies of the analytical laboratory reports and sampling records.

Please let us know if you have any questions or comment relative to this proposed work plan.

Yours truly,

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Principal

Laurent C. Levy, Ph.D., P.E.
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Attachment Figure 1 – Proposed Exploration Location Plan

cc: Wayne Reiber, Cabot Corporation

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Proposed Exploration Location Plan

Cabot Carbon/Koppers Superfund Site, Gainesville, Florida

FIGURE 1

Date: 1/6/2017

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